Bharat Heavy Electricals Limited

High Pressure Boiler Plant
Tiruchirappalli – 620 014. India
Civil Engineering Department (Factory)

TENDER DOCUMENT (PRICE BID)

Name of work	:	**Operation and Maintenance of Coolant and Metal Recovery System at BHEL, Trichy.**
Value of work	:	**Rs. 30.91 Lakh**
Tender Notice No.	:	**02/11-12**
Tender Schedule No.	:	**09/11-12**
Period of Contract	:	**15 (Fifteen) Months**
Issued to M/s / S/Shri	:	

SCHEDULE 'A'

LIST OF WORKS AND PRICES

DETAILS & QUANTITIES of each item of work shown in the BILL OF QUANTITIES are only approximate. They are given as a guide for the purpose of tendering only and are liable to variation and alteration of the Competent Authority. The work under each item as executed shall be measured and priced at the corresponding rate quoted by the contractor in the BILL OF QUANTITIES

Sl.No.	Description of work / supplied	Total amount of work / supplies (in figures and words) Rs. Ps.	Period of contract
1.	Operation and maintenance of Coolant and Metal Recovery Systems at BHEL, Trichy.	Rs. 30,91,000/- (Rupees thirty lakh ninety one thousand only)	Fifteen (15) months

BILL OF QUANTITIES

Sl.No.	Appx.Qty.	Description of work	TNBP No.	Rate (Both in Unit fig & Words	Amount Rs.	Ps.

AS PER SEPARATE SHEETS ATTACHED CONTAINING ……**11**…PAGES

FROM SERIAL No……**3**…… to……**13**……..

BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPPALLI – 14

BILL OF QUANTITIES

NAME OF WORK: Operation and Maintenance of Coolant & Metal Recovery systems at BHEL, Trichy.

PART - A: COOLANT RECOVERY SYSTEM

Sl. No.	Quantity	Description of work	Rate (both in figures and in words)	Unit	Amount Rs. P.
1.	15 Months	Operation and maintenance of existing Coolant Recovery plant at BHEL, Trichy-14. The scope of work covers Operating the Coolant Recovery plant for two shift in a day, as convenient to BHEL and on all BHEL working days including collection of the waste coolant from the machine shops within Main Factory complex, Conveying in the barrels/carboys to the centralised Coolant Treatment Plant near Heat Treatment Shop, Storing in syntax tanks or M.S barrels and processing it to make it fit for recycling, transferring the processed coolant to the machine shop and pouring in Coolant sumps after cleaning the pits where ever required etc. complete. The scope also includes mechanical & electrical maintenance of the coolant recovery system including periodical preventive maintenance, replacement of all spares (as indicated in Sl.No.2 and other spares supplied by BHEL), supply of required quantity of chemicals and consumables for uninterrupted maintenance & operation of the system, testing of Raw and Treated Coolant etc., complete vide details listed in the annexure-A. The quoted rate includes cost of all labour, chemicals, consumables, spares (other than spares listed in Sl.No.2 and other spares supplied by BHEL) testing charges, Tax & duties if any and all other incidental charges, etc., complete.		Month	

Sl. No.	Quantity	Description of work	Rate (both in figures and in words)	Unit	Amount Rs. P.
2.		Supply of the following spares for the operation of the equipment. The quoted rate shall include cost of spares, Taxes, duties, packing, forwarding, conveyance and all other incidentals, etc., complete. **The spares supplied shall be guaranteed for not less than one-year wherever not specified.**			
a)	6 Nos.	**Bag Filter** consists of filter media made of HDPE woven with 10-25 microns pore size bag stitched for 200mm dia. with flanged end.		Each	
b)	12 Nos.	**Cartridge Filter** consists of 5/10-micron resin bonded 10" long cartridge (Ametek make).		Each	
c)	200.00 kg.	Activated carbon with Iodine No.1200 mg/gm (Min.) and apparent density 0.45 gm/cc(Min.)		Kg.	
d)		**Spares for Photo Chemical Reactor.**			
i)	6 Nos.	**Ballast** – Electronic ballast duplex for 2 lamps - 22 watts each.		Each	
ii)	16 Nos.	**Glass Tubes** – coated with UV Reflector– 340mm long, 20mm dia.		Each	

Sl. No.	Quantity	Description of work	Rate (both in figures and in words)	Unit	Amount Rs. P.
3	1 Set	**Photo Chemical Reactor** of capacity 500 lph comprising 6 Nos. of UV lamps, Polymer tubes, ballast and Glass tubes covered in powder coated M.S metal leak proof Box with inlet and outlet arrangements, etc. complete.		Per Set	
		(i) The imported UV Lamp – 22 watts and 425mA, single ended 4-pin type low pressure and High intensity with a UV dosage of 50,000 to 60,000 Micro watts/cm^2/sec. – 435mm long and 19mm dia. With Ozone and UV resistant ceramic base. The life of UV lamp should be guaranteed for 7000 hrs. working.			
		(ii) For other items like polymer tube, glass tube, ballast, etc., the specification shall be as indicated above in this bill of quantities.			
			TOTAL for Part – A		

PART - B: METAL RECOVERY SYSTEM

Sl. No.	Quantity	Description of work	Rate (both in figures and in words)	Unit	Amount Rs. P.
1.	15 Months	Operation and maintenance of existing Metal Recovery Plant at BHEL, Trichy-14 for **two shifts a day,** as convenient to BHEL and on all BHEL working days including collection of the effluent from the rinse tanks of Chromium, treating the same in the metal recovery plant to achieve the permeate meeting the Pollution Control Board standards and make it fit for reuse. The scope also includes mechanical & electrical maintenance of the Metal recovery system including periodical preventive maintenance, replacement of the defective parts / spares (as indicated in Sl.No.2 and other spares supplied by BHEL), supply of required quantity of chemicals and consumables for uninterrupted maintenance & operation of the system, testing of permeate and the reject etc., complete, vide details listed in the annexure-B, complete. The quoted rate includes cost of all labour, consumables, chemicals, materials, spares (other than spares listed in Sl.No.2) testing charges, duties if any and all other incidental charges, etc., complete.		Month	
2.		Supply of the following spares for the operation of the equipment. The quoted rate shall include cost of spare, Taxes, duties, packing, forwarding, conveyance and all other incidentals, etc., complete. **The spares supplied shall be guaranteed for not less than one year wherever not specified.**			

Sl. No.	Quantity	Description of work	Rate (both in figures and in words)	Unit	Amount Rs. P.
a)	4 Nos.	**Micron Filter** made of Polypropylene material with 10 Micron rating, having a capacity 500 lph (Millipore or equivalent make as approved by BHEL).		Each	

NOTE:

1. The quoted rate shall be firm throughout the contract period. No cost escalation will be paid on any account.
2. The above coolant and metal recovery systems to be operated in two shifts in a day as mentioned in item No. 1 of part A & item 1 of Part B.
3. The contractor has to deploy minimum labourers individually for each system as mentioned below for the smooth operation of the systems..
   - a Supervisor (Skilled) 1 No. / day / system (i.e. 1 No. for coolant recovery system & 1 No. for metal recovery systems. Total- 2 man days for each day.
   - b Operator (Semi- skilled) 1 No. / shift / system (i.e. 1Nos. x 2 shifts x 2 systems = 4 Man days each day)
   - c Workers (Unskilled) - 5 Nos. / shift/ coolant recovery system alone (i.e. 5 Nos. x 2 shifts x 1 system= 10 Man days each day)
4. The labourers shall be paid additional payment as mentioned below in addition to the payment of minimum wages, Bonus to the workmen employed by him at the rates which shall not be less than the minimum wages applicable from time to time .(Un Skilled Worker - Rs. 2000/ Pm, Semi Skilled Worker Rs. 2300/pm & Skilled worker Rs. 2500/pm.)
5. If both the the coolant Recovery system and metal recovery systems are not operated for more than 24 hours due to break down on any unforeseen account of other than power supply,non availability of raw effluents,spares,etc., recovery will be made on pro rata basis as per the approved and awarded rate in Sl.No.1 of Part A & Sl.No.1 of Part B per month from the date of stoppage to the date of putting back in to operation effectively.
6. In case of any eventuality for not operating any of the systems as stated above, the man power shall be suitably redeployed. No separate compensation will be paid for non operation of the systems.

TOTAL for Part - B .. .. ..

TOTAL for Part - A .. .. .. _____

GRAND TOTAL .. ..

_____

(RUPEES ……ONLY)

ANNEXURE – A

SPECIAL CONDITIONS OF CONTRACT FOR OPERATION AND MAINTENANCE OF COOLANT RECOVERY SYSTEM:

01 The tenderers are advised to visit the existing Coolant Recovery System Plant at BHEL, Trichy in order to assess the nature of work, man power requirement etc., before submitting their offer..

02 The contractor should engage skilled labourers and supervisors for two shift operations as per the man power deployment scheme to be submitted by the tenderer for operation & treating the waste coolant and for transporting the waste coolant from various buildings like Building No.1, 5, 6, 50, SSTP etc. to the centralised treatment plant located near Heat Treatment shop, transporting the treated Coolant back to machine shops, cleaning the coolant pits and filling the sump, etc. The labourers engaged should be paid not less than the prevailing minimum wages as per State Government norms.

03 The tenderer should submit details of manpower deployment scheme to be employed per shift like supervisor other supporting labourers, etc., along with the tender.

04 Operation and maintenance is to be carried out in **Two shifts a day**. For want of coolant, Power supply, etc., the system can be operated in one shift occasionally, only with the prior approval of the Engineer-in-charge.

05 If the labourers, supervisors etc., are not employed as per the manpower deployment scheme the recovery will be made from the payment at pro-rata basis.

06 **The work is to be executed on all BHEL working days.**

07 If the system is not operated for more than 24 hours due to break-down on account of other than Power Supply, non availability of Coolant, Spares, etc., recovery will be made on pro rata basis **as per the approved and awarded rate as in Sl.No.1** per month from the date of break down to the date of putting back the system to perform effectively.

08 In case of any eventuality for not operating any of the systems as stated above, the man power shall be suitably redeployed. No separate compensation will be paid for non operation of the systems.

09 If any additional shift is felt required by BHEL and operated on any day of the month, payment will be made on pro rata basis **as per the approved and awarded rate in Sl.No.1** per month.

10 Required minimum space, Compressed air, water and power for the operation of the system will be provided by BHEL free of charges.

11 **Raw coolant, processed coolant and the permeate discharge should be tested for pH, Conductivity, Temperature and Volume for every batch taken for processing and a record should be maintained and produced to BHEL for its verification.**

12 Bacteriological Analysis for TBC using Bactaslide once in a week or as and when required by BHEL on Raw and Processed coolant should be conducted at the site. The number of tests will be limited to five per month i.e 4 (four) for checking the Treated Coolant and 1 (one) per month for checking the Raw waste coolant. The used Bactaslides will be burn / destroyed in the presence of Engineer - in- charge and disposed with out affecting the environment.

13 The composite sample of the permeate discharged and the raw coolant water shall have to be analysed for BOD, COD, Suspended Solids and Total dissolved solids, Oil & Grease, Chlorides, Sulphates etc., at the agency's laboratory established at BHEL Trichy Complex or in any of the approved lab (King's Institute, Chennai, NIT, Trichy, TNPCB labs in TamilNadu, etc.) as directed by BHEL, in line with the laid down procedures of BIS. One sample of raw waste coolant and one sample of permeate once in a month has to be collected, analysed and the report of analysis should be submitted to BHEL for verification.

14 The contractor should maintain proper logbook for the performance of the system and the log book should contain the details of the quantity of collection of the waste coolant, Point of collection, quantity treated, quantity handed over, name of work centre, etc., complete.

15 The contractor shall ensure payment of Minimum wages, Bonus to the workmen employed by him at the rate which shall not be less than the minimum wages applicable under Law from time to time.

16 The workmen should be covered by PF & ESI Act as applicable and payment will be made only on verification of the documents for the remittance of ESI and PF for the personnel engaged in the work.

17. The spent Activated Carbon shall have to be dumped in the coal yard by the agency.

18. The treated Coolant will be collected and accounted separately and handed over to machine shops as and when required.

19. The collected tramp oil should be handed over by the contractor to the Stores of BHEL at his cost.

20. Hand trolleys are to be arranged by the contractor for collection of coolant.

21. The spares listed in Sl.No.;2 of Bill of Quantities are tentative. Any other spares not listed, if supplied and provided will be reimbursed as per BHEL norms.

22. Spares like UV lamps, Ultra Filtration Membrane, High Pressure Pump etc., will be supplied by BHEL and the same shall be installed in the system by the contractor at no extra cost
.

23. If the spares supplied by the contractor found defective during the guarantee period, it should be serviced / replaced at the contractor's risk and cost to the satisfaction of the Engineer-in-charge. 50% of Security Deposit will be released only after the guarantee period is over.

24. The contractor should submit the list and quantity of consumables and spares used every month for the verification by BHEL
.

25. The workers should be provided with personal protective equipments such as Gloves, Goggles, safety shoes and waste cloths, etc by the Contractor.

26. The Contractor should supply and use the monitoring equipments such as pH meter, Conductivity meter, Thermometer, Glass beakers, etc.

27 The Replacement of inter connecting HDPE pipes, indicator bulbs, tubings, Sensors with cables, etc are in the scope of the Contractor

28 The contractor should keep a First Aid Box with list of Aids and should be refilled as and when required.

COOLANT RECOVERY SYSTEM

ROUTINE MAINTENANCE & OPERATION

1) The existing system is capable of treating about 750 litres of waste coolant per shift.

2) All the chemicals required for routine maintenance and operation shall be supplied by the contractor.

3) Bag filter and Cartridge filter are cleaned not less than twice in a week by rinsing in caustic soda solution and washing it with fresh water.

4) The Activated Carbon Filter is washed with caustic soda solution and fresh water at the end of week's operation (Saturday) and filled with fresh water and kept for 24 hours or up to starting of next shift. The entire Activated Carbon will be replaced with fresh materials once in 45 days. The spent activated carbon shall be disposed at the coal yard of PG Plant or as directed by the Engineer-in-charge.

5) Ultra filtration, Disinfection unit and process tank are to be cleaned daily after the end of the shift.

6) Monitoring and maintaining the pressure shall be done at inlet and outlet of the Membrane System.

7) The Ultra filtration unit is cleaned daily by circulating DM water for about 20 minutes and saturated with fresh water by proper closing of inlet and outlet valves.

8) At the end of week's operation, the Ultra filtration unit is filled with soap water and kept in until further usage of system.

9) Surface Disinfection unit is to be cleaned with surf water (200gms of Aerial powder in 25 lit. water) circulated for 30 minutes and washed with fresh water. This is carried out twice in week.

10) The pH, TDS, and Temperature of the raw coolant are checked and recorded before treatment.

11) After 30 minutes of circulation again pH, TDS and Temperature are checked and the treated coolant is handed over for recycling.

12) TDS of the treated coolant shall be corrected if it exceeds 1000 ppm, by adding fresh water and disinfected on repeated cycles.

13) Bactaslide is used to find the bacterial content of the coolant before and after disinfection. The number of tests will be limited to not more than five per month i.e.4 (four) for checking the treated coolant and 1 (one) for checking the raw coolant once in a month.

14) The treated and disinfected coolant shall have a bacterial count not more than 10^2.

15) The contract agency has to fix all the spares supplied by him and also the spares supplied by BHEL at his own cost.

16) The contractor should put up his Bill for his month wise payment along with, (a) Production Report, (b) Test Report of the Raw waste and coolant water Permeate, (c) Attendance particulars, (d) Pay Acquitance and (e) PF & ESI remittance challans.

ANNEXURE-B

SPECIAL CONDITIONS OF CONTRACT FOR OPERATION AND MAINTENANCE OF METAL RECOVERY SYSTEM:

01 The tenderers are advised to visit the existing Metal Recovery System Plant at BHEL, Trichy in order to assess the nature of work, man power requirement etc., before submitting their offer.

02 The contractor should engage skilled labourers and supervisors for two shift operations as per the man power deployment scheme to be submitted by the tenderer for operation & maintenance of Metal recovery system located at Heat Treatment shop. The labourers engaged should be paid not less than the prevailing minimum wages as per State Government norms.

03 The tenderer should submit details of manpower deployment scheme to be employed per shift like supervisor other supporting labourers, etc., along with the tender.

04 Operation and maintenance is to be carried in two shifts a day. For want of effluent power supply, etc., the system can be operated in one shift occasionally. Only with the prior approval of the Engineer-in-charge.

05 The work is to be executed on all BHEL working days.

06 If the labourers, supervisors etc., are not employed as per the manpower deployment scheme the recovery will be made from the payment at pro-rata basis.

07 If the system is not operated for more than 24 hours due to break-down on account of other than Power Supply, non availability of effluent, Spares, etc., recovery will be made on pro rata basis **as per the approved and awarded rate in Sl.No.1** per month from the date of break down to the date of putting back the system to perform effectively.

08 In case of any eventuality for not operating any of the systems as stated above, the man power shall be suitably redeployed. No separate compensation will be paid for non operation of the systems.

09 If any additional shift is felt required by BHEL and operated on any day of the month, payment will be made on pro rata basis as per the approved and awarded rate in Sl.No.1 per month.

10 Required minimum space, Compressed air, water and Power for the effective functioning of the system will be provided by BHEL free of charges.

11 Rinse water and the concentrate should be tested for pH, Conductivity, Temperature and Volume for every batch taken for processing and recorded for BHEL's verification.

12 The composite sample of the permeate discharge and the Reject (concentrate) shall have to be analysed for BOD, COD, Suspended Solids Total dissolved solids, Chromium (hexavalent/Trivalent), Cadmium/Copper / Nickel / Iron / Chlorides / Sulphates, etc at the agency's laboratory at BHEL Trichy Complex or in any of the approved lab (King's Institute, Chennai, NIT, Trichy, TNPCB labs in TamilNadu, etc.) as directed by BHEL, in line with the laid down procedures of BIS once in a month The permeate and the Reject samples are to be tested once in a month.

13 The contractor should maintain proper log book for the performance of the system for the scrutiny by BHEL. The log book should contain the details of the quantity of collection of the rinse water, Point of collection, concentrate and permeate recovered, point of handing over etc.

14 The contractor shall ensure payment of Minimum wages , Bonus to the workmen employed by him at the rate which shall not be less than the minimum wage applicable under Law from time to time.

15 The workmen should be covered by PF & ESI Act as practiced and payment will be made only on verification of the documents for the remittance of ESI and PF for the personnel engaged in the work.

16 The spares listed above are tentative. Any other spares not listed, if supplied and provided will be reimbursed as per BHEL norms.

17 Spares like UV lamps, RO membrane, High Pressure Pump etc., will be supplied by BHEL and the same shall be installed in the system by the contractor at no extra cost.

18 If the spares supplied by the contractor found defective during the guarantee period, it should be serviced / replaced at the contractor's risk and cost to the satisfaction of the Engineer-in-charge. 50% of Security Deposit will be released only after the guarantee period is over.

19 Every month the contractor should submit the list for the quantity of consumables and spares used for the verification by BHEL.

20 The workers should be provided with personal protective equipments such as Gloves, Goggles, safety shoes, and waste cloths etc., by the contractor.

21 The Contractor should supply and use the monitoring equipments such as pH meter, Conductivity meter, Thermometer, Glass beakers, etc.

22 The Replacement of inter connecting HDPE pipes, Indicator bulbs, Tubings, Sensors with cables, etc are in the scope of the Contractor

23 The contractor should keep a First Aid Box with list of Aids and should be refilled as and when required.

24 The permeate and the reject will be collected and accounted separately and handed over to user department.

METAL RECOVERY SYSTEM

ROUTINE MAINTENANCE & OPERATION

1. The existing system is capable of treating about 250 litres of rinse water per shift.

2. All the chemicals required for routine maintenance and operation shall be supplied by the contractor.

3. Running of the whole system with fresh water for 15 minutes. and with permeate water for about 15 minutes.

4. The pH value of the rinse water is to be corrected for values not less than 4.5

5. Measure the TDS of the raw effluent. (Rinse water)

6. Temperature of rinse water shall be measured and corrected to ambient by allowing it for natural cooling (38^{o} C to 40^{o}C)

7. Monitoring and maintaining pressure shall be done at the inlet and out let of Membrane system.

8. At the end of the day, the entire system should be cleaned with fresh water and permeate water and the membrane should be kept in saturated condition with permeate water by proper closing of valves at the outlet and Inlet of the system

9. Recording of pH, TDS, Temperature, pressure and flow details at the end of each batch.

10. Reloading the system with fresh effluent once the batch TDS of permeate is 100 to 110 and that of Reject is in the order of 1200 to 1300.

11. Every week the cartridge filter should be cleaned by rinsing in caustic soda solution and washing it with fresh water. The cartridge filter will be replaced once in 3 months.

12. Once in 15 days cleaning of the membrane in solution containing 400 gm of citric acid in 20 lit. of water correcting the solution for its pH value not less than 4.5 by adding about 120 ml. of Ammonia solution, circulating the solution by closing the permeate value for about 30 minutes. and kept saturated not less than 2 hours or during the closed Holidays.

13. Accounting of permeate and Reject in carboys / PVC tanks etc. and handing over to the user department.

14. Over hauling and servicing of High pressure pump once in two months.

15. The contractor should put up his Bill for his month-wise payment along with (a) Production Report, (b) Test Report of the rinse water and permeate, (c) Attendance particulars, (d) Pay Acquitance & (e) PF & ESI remittance.